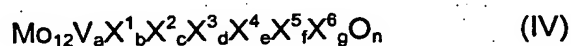


We claim:

1. A process for partially oxidizing acrolein to acrylic acid in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture which comprises acrolein, molecular oxygen and at least one inert gas containing at least 20% by volume of molecular nitrogen and contains the molecular oxygen and the acrolein in a molar $O_2:C_3H_4O$ ratio of ≥ 0.5 in one reaction stage over a fixed catalyst bed which is arranged in two spatially successive reaction zones A,B, the temperature of reaction zone A being a temperature in the range from 230 to 320°C and the temperature of reaction zone B likewise being a temperature in the range from 230 to 320°C, whose active composition is at least one multimetal oxide comprising the elements Mo and V, in such a way that reaction zone A extends to an acrolein conversion of from 45 to 85 mol% and, on single pass of the starting reaction gas mixture through the overall fixed catalyst bed, the acrolein conversion is ≥ 90 mol% and the selectivity of acrylic acid formation, based on acrolein converted, is ≥ 90 mol%, the chronological sequence in which the starting reaction gas mixture flows through the reaction zones corresponding to the alphabetic sequence of the reaction zones, wherein
 - a) the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is ≤ 145 l (STP) of acrolein/l of fixed catalyst bed·h and ≥ 70 l (STP) of acrolein/l of fixed catalyst bed·h,
 - b) the volume-specific activity of the fixed catalyst bed is either constant or increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed, and
 - c) the difference $T^{maxA} - T^{maxB}$, formed from the highest temperature T^{maxA} which the reaction gas mixture has within the reaction zone A and the highest temperature T^{maxB} which the reaction gas mixture has within reaction zone B, is $\geq 0^\circ\text{C}$.
2. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq 0^\circ\text{C}$ and $\leq 75^\circ\text{C}$.
3. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq 3^\circ\text{C}$ and $\leq 60^\circ\text{C}$.
4. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq 5^\circ\text{C}$ and $\leq 40^\circ\text{C}$.

5. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is ≥ 70 l (STP) of acrolein/l·h and ≤ 140 l (STP) of acrolein/l·h.
- 5 6. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is ≥ 80 l (STP) of acrolein/l·h and ≤ 130 l (STP) of acrolein/l·h.
- 10 7. A process as claimed in any of claims 1 to 5, wherein the active composition of the fixed catalyst bed is at least one multimetal oxide active composition of the general formula IV



15 where the variables are defined as follows:

- X^1 = W, Nb, Ta, Cr and/or Ce,
 X^2 = Cu, Ni, Co, Fe, Mn and/or Zn,
 X^3 = Sb and/or Bi,
 20 X^4 = one or more alkali metals,
 X^5 = one or more alkaline earth metals,
 X^6 = Si, Al, Ti and/or Zr,

- a = from 1 to 6,
 25 b = from 0.2 to 4,
 c = from 0.5 to 18,
 d = from 0 to 40,
 e = from 0 to 2,
 f = from 0 to 4,
 30 g = from 0 to 40, and
 n = a number which is determined by the valency and frequency of the elements other than oxygen in IV.

8. A process as claimed in any of claims 1 to 7, wherein the volume-specific activity of the fixed catalyst bed increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed.
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